REMARKS

Claims 1, 3, 6, and 8 are pending in the application. Claims 2, 4, 5, 7, 9, and 10 are canceled.

Claims 5 and 10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Claims 5 and 10 are canceled and the features of claim 5 are incorporated into claim 3 and the features of claim 10 are incorporated in to claim 8. The Action asserts that the specification only supports the requirement of a single ratio between the frequency before conversion and the frequency after conversion as an integer of 2 or higher and does not provide any support for the requirement of a second ratio between a local signal and the signal under test as an integer of 3 or higher. Applicant respectfully disagrees. Page 12, line 3 of the application provides the equation, as follows:

$$f_{IF} = \frac{1}{N} f_{m} = \frac{1}{N+1} f_{LO}$$

Page 12, line 5 of the application further provides that "N is an integer of 2 or higher." Thus, N is a ratio of the frequency of the predetermined frequency signal, f_m, and the signal under test f_{IF} and (N+1) is a ratio of the frequency of a local signal inputted into the frequency converted and the signal under test. Accordingly, if N is an integer 2 or higher, then (N+1) is an integer 3 or higher. Therefore, Applicant respectfully submits that a ratio of the frequency of the pre-determined frequency signal and the signal under test is an integer of 2 or higher, and wherein a ratio of the frequency of a local signal inputted into the frequency converter and the signal under test is an integer of 3 or higher, as provided in claims 3 and 8 is supported by the specification and complies with 35 U.S.C. 112, first paragraph. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 1, 3 and 5 are rejected under 35 U.S.C. 102(b) as being unpatentable over U.S. Patent No. 5,808,463 to Nagano. Claims 1 and 3 are independent. Applicant respectfully traverses this rejection. Claim 3 incorporates the features of claim 5 that is canceled.

Claim 1 provides a vector-detecting apparatus that detects an in-phase component and a quadrature-phase component of a pre-determined frequency signal. The apparatus includes a first filter and a second filter whose impulse response is orthogonal to the first filter. An output of the first filter is regarded as the in-phase component of the pre-determined frequency signal, and output of the second filter is regarded as the quadrature-phase component of the pre-determined frequency signal. An impulse response of the first filter is weighted by a sine function of the frequency of the pre-determined frequency signal and an impulse response of the second filter is weighted by a cosine function of the frequency of the pre-determined frequency signal. The first filter is a single filter that has an impulse response weighted by a sine function of the frequency of the pre-determined frequency signal and the second filter is a single filter that has an impulse response weighted by a cosine function of the frequency of the pre-determined frequency signal. The first filter and the second filter are digital filters.

Nagano discloses a measurement apparatus for measuring a leakage power of an adjacent channel of a transmitting channel, of a device under test (DUT) 1 (col. 4, lines 63-67). The DUT 1 produces a transmitting signal, and measurement apparatus executes a complex FFT (fast Fourier transformation) using a digital signal processor (DSP) 4 to measure the adjacent channel power (col. 5, lines 1-5).

Nagano fails to disclose or suggest that the first filter is a <u>single filter</u> that has an impulse response weighted by a sine function of the frequency of the pre-determined frequency signal and the second filter is a <u>single filter</u> that has an impulse response weighted by a cosine function of the frequency of the pre-determined frequency signal, as recited in claim 1. In contrast, within the quadrature detector 400 of Nagano, signal generators 402 and 404 and multipliers 401 and 403 are provided (col. 5, lines 53-54). The generators 402 and 404 generate digital values of a cosine signal and a sine signal every sampling, respectively, the cosine and sine signals having a same frequency f_H (col. 5, lines 54-57). The multipliers 401 and 403 multiply the cosine signal and the sine signal with the digital signal 211 supplied to the quadrature detector 400, respectively

(col. 5, lines 57-60). An output signal 212 of the multiplier 401 indicates the in-phase component and is input to the low-pass filter 405, and an output signal 213 of the multiplier 403 indicates the quadrature component and is input to the low-pass filter 406 (col. 5, lines 60-64). Therefore, Nagano requires signal generators 402 and 404 and multipliers 401 and 403.

Thus, Nagano fails to disclose or suggest the elements of claim 1. Accordingly, claim 1 is patentable over Nagano.

Claim 3 provides a vector-detecting apparatus that detects an in-phase component and a quadrature-phase component of a pre-determined frequency signal. The apparatus includes a frequency converter for converting the pre-determined frequency signal to a signal under test, a first filter, and a second filter. The first and second filters filter an output signal of the frequency converter and whose impulse responses are orthogonal to each other. An output of the first filter is regarded as the in-phase component of the signal under test, and an output of the second filter is regarded as the quadrature-phase component of the signal under test. An impulse response of the first filter is weighted by a sine function of the frequency of the signal under test after frequency conversion by the frequency converter, and an impulse response of the second filter is weighted by a cosine function of the frequency of the signal under test after frequency conversion by the frequency converter. The first filter and the second filter are digital filters. A ratio of the frequency of the pre-determined frequency signal and the signal under test is an integer of 2 or higher. A ratio of the frequency of a local signal inputted into the frequency converter and the signal under test is an integer of 3 or higher.

Nagano merely provides that "[i]n the present embodiment, the transmitting channel may be present in any of frequency regions. However, it will be most typical in several ten MHz to several ten GHz" and "f_H=f_{IP}/4." (col. 5, lines 22-24 and col. 8, line 19). f_H is defined as the cosine and sine signals having the same frequency. (col. 5, lines 56-57). f_{IP} is defined as a frequency that is the same as the sampling frequency.

(col. 8, lines 13-14). Thus, Nagano fails to disclose or suggest a ratio of the frequency of the pre-determined frequency signal and the signal under test is an integer of 2 or higher, let alone a ratio of the frequency of a local signal inputted into the frequency converter and the signal under test is an integer of 3 or higher, as provided by claim 3.

For the reasons set forth above, it is submitted that the rejection of claims 1 and 3 under 35 U.S.C. 102(b) as unpatentable over Nagano is overcome. Applicant respectfully requests that the rejection of claims 1 and 3 be reconsidered and withdrawn.

Claims 6, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagano in view of U.S. Patent No. 4,888,701 to Wakasugi et al., hereinafter "Wakasugi". Claims 6 and 8 are independent. Claim 8 is amended to incorporate the features of claim 10 that is canceled. Applicant respectfully traverses this rejection.

Nagano is described above. Wakasugi provides an apparatus for providing projections of signals supplied to two inputs on mutually perpendicular axises by applying a different combination of the signals respectively at the input terminals and quadrature phases of an AC wave to each of four phase detectors or by applying each combination in sequence to each phase detector.

Claim 6 provides an impedance measuring apparatus comprising a vector-detecting apparatus. The vector-detecting apparatus includes a first filter and a second filter whose impulse responses are orthogonal to each other. An output of the first filter is regarded as an in-phase component of a pre-determined frequency signal, and an output of the second filter is regarded as a quadrature-phase component of the pre-determined frequency signal. The impulse response of the first filter is weighted by a sine function of the frequency of the pre-determined frequency signal and the impulse response of the second filter is weighted by a cosine function of the frequency of the pre-determined frequency signal. The first filter is a single filter that has an impulse response weighted by a sine function of the frequency of the pre-determined frequency

signal and the second filter is a single filter that has an impulse response weighted by a cosine function of the frequency of the pre-determined frequency signal. The first filter and the second filter are digital filters.

As described above in the discussion of claim 1, Nagano does not disclose or suggest that the first filter is a single filter that has an impulse response weighted by a sine function of the frequency of the pre-determined frequency signal and the second filter is a single filter that has an impulse response weighted by a cosine function of the frequency of the pre-determined frequency signal, as recited in claim 1. Similarly, Nagano fails to disclose or suggest that the first filter is a single filter that has an impulse response weighted by a sine function of the frequency of the pre-determined frequency signal and the second filter is a single filter that has an impulse response weighted by a cosine function of the frequency of the pre-determined frequency signal, as provided in claim 6. Thus, Nagano fails to disclose or suggest the elements of claim 6.

Applicant does not believe that Wakasugi makes up for the deficiencies of Nagano, as they apply to claim 6. Accordingly, Applicant submits that claim 6 is patentable over the cited combination of Nagano and Wakasugi.

Claim 8 provides an impedance measuring apparatus that measures an in-phase component and a quadrature-phase component of a pre-determined frequency signal. The apparatus includes a frequency converter, a first filter, and a second filter. The first and second filters are capable of filtering an output signal of the frequency converter and whose impulse responses are orthogonal to each other. An output of the first filter is regarded as the in-phase component of the pre-determined frequency signal, and an output of the second filter is regarded as the quadrature-phase component of the pre-determined frequency signal. The impulse response of the first filter is weighted by a sine function of the frequency of the pre-determined frequency signal after frequency conversion by the frequency converter and the impulse response of the second filter is weighted by a cosine function of the frequency of the pre-determined frequency signal

after frequency conversion by the frequency converter. The first filter and the second filter are digital filters. A ratio of the frequency of the pre-determined frequency signal and the signal under test is an integer of 2 or higher, and wherein a ratio of the frequency of a local signal inputted into the frequency converter and the signal under test is an integer of 3 or higher.

As discussed above, Nagano fails to disclose or suggest a ratio of the frequency of the pre-determined frequency signal and the signal under test is an integer of 2 or higher, let alone a ratio of the frequency of a local signal inputted into the frequency converter and the signal under test is an integer of 3 or higher, as provided by claim 3. Similarly, Nagano fails to disclose or suggest a ratio of the frequency of the pre-determined frequency signal and the signal under test is an integer of 2 or higher, let alone a ratio of the frequency of a local signal inputted into the frequency converter and the signal under test is an integer of 3 or higher, as provided by claim 8. Thus, Nagano fails to disclose or suggest the elements of claim 8.

Applicant does not believe that Wakasugi makes up for the deficiencies of Nagano, as they apply to claim 8. Accordingly, Applicant submits that claim 8 is patentable over the cited combination of Nagano and Wakasugi.

For the reasons set forth above, it is submitted that the rejection of claims 6 and 8 under 35 U.S.C. 103(a) as being unpatentable over Nagano in view of Wakasugi is overcome. Applicant respectfully requests that the rejection of claims 6 and 8 be reconsidered and withdrawn.

An indication of the allowability of all pending claims by issuance of a Notice of Allowability is earnestly solicited.

Respectfully submitted,

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Paul D. Greeley
Reg. No. 31,019
Attorney for Applicant
Ohlandt, Greeley, Ruggiero & Perle, LLP
One Landmark Square, 10th Floor
Stamford, CT 06901-2682
Tel: (203) 327-4500
Fax: (203) 327-6401